REMARKS

In the Office Action mailed February 6, 2006 claims 1, 4–17 and 20–27 were rejected. Reconsideration and allowance of all pending claims are requested.

Rejections Under 35 U.S.C. § 102

The Examiner rejected claims 1, 4, 5, 7, 10-13, 15-17, 20 and 27 under 35 U.S.C. § 102(b) as being anticipated by Witek et al. (U.S. Patent No. 6,146,970, hereinafter "Witek"). Applicants submit that all of the claims are distinguishable over Witek. In particular, independent claims 1 and 17 specifically recite filling a trench by conformally depositing an optically isolating material, which is neither taught nor suggested by Witek.

Layer 216a of Witek is not optically isolating.

Witek teaches a method for forming a capped shallow trench isolation structure. In the first embodiment of the reference, Witek teaches depositing a trench fill material 216a over a top surface of a semiconductor wafer 202. The material 216a used is tetraethylorthosilicate (TEOS).

TEOS is essentially equivalent to the material used in the reference of Lucas discussed in the previous office action response. As mentioned in the previous office action response with respect to Lucas (the discussion of which is hereby incorporated herein by reference), the Examiner has not demonstrated that this material would or could function as an optically isolating material.

Therefore, Witek again teaches a material and structure that has not been demonstrated as capable of providing the claimed optical isolation.

Layer 216c of Witek is etched to a level such that the device would not be optically isolating.

In Fig. 10 of the reference, the material 216c is filled in the trench as a second trench fill material. Even if this material could be polysilicon, the reference specifically recites that it should be etched down far enough to expose a portion of the sidewall within the trench. Therefore, layer 216c does not entirely fill the trench. Alternatively, the process of filling the trench is not followed by a planarizing process. Instead, it is followed by etching further down to a level below that of a planarizing level so that the side walls of the trench are exposed as clearly shown in Figs. 10 and 11. Witek also discloses in col. 7, lines 60- 64:

> In another form, any ordered combination of one or more wet etch and reactive ion etch or plasma etch steps may be used to remove portions of layer 214b, the liner 212, and a top portion of the trench plug region 216b. It is important that the etch time used to recess the layer 216b to form the recess trench plug region 216c in FIG. 10 is long enough to expose some portion of the sidewall of the substrate 202 within the trench region.

In addition, as recited in col. 8, lines 33- 38:

> Therefore, FIG. 12 illustrates that a top portion of the trench region has been capped by silicon nitride or like layer 218b whereby the silicon nitride layer 218b will protect the underlying bulk trench fill material 216c. The polished process performed in FIG. 12 is performed selective to the polysilicon layer 206 in FIG. 12.

As recited above, the trench is filled with a capping layer of silicon nitride 218b above the polysilicon trench fill material 216c. Hence, the trench is filled with a material or in a manner that is *not optically isolating.*

The interchangeability of polysilicon and other non-optically isolating materials demonstrates that Witek does not teach optical isolation.

Witek teaches depositing a capping layer of silicon nitride over a second trench fill material that can comprise polysilicon as shown in Figs. 11-13. Silicon nitride, while known as an electrical insulator, is not known to be an optically isolating material.

Witek recites, *inter alia*, in col. 11, lines 14- 22:

> Furthermore, the capping layer 218b of FIG. 13 may be RIE etched by a nitride etch environment to reduce its height and thereby reduce stringer problems. The trench fill material 216c may be polysilicon or a like semiconductor trench fill capped by a silicon nitride layer 218b. In addition, the silicon nitride capping layer or oxynitride capping layers taught herein may be replaced with a TEOS layer that is denser than the underlying bulk trench fill TEOS whereby erosion is avoided.

Clearly, the replacement of polysilicon with a capping of a silicon nitride layer, oxynitride layers or a TEOS layer indicates that, because these materials are interchangeable in the Witek device, and in addition, because none of these materials have been demonstrated to be optically isolating, Witek does *not teach* optical isolation.

Rejections Under 35 U.S.C. § 103

The Examiner rejected claims 6 and 22 under 35 U.S.C. §103(a) as being unpatentable over Witek in view of Pallinti et al. (U.S. Patent No. 6,607,967).

The Examiner also rejected claims 8, 9, 21 and 23-26 under 35 U.S.C. §103(a) as being unpatentable over Witek in view of Guo (U.S. Patent No. 6,894,357).

All of these claims depend directly or indirectly on allowable base claims 1 and 17. Accordingly, these claims are believed to be clearly patentable at least by virtue of their dependency from the allowable base claims.

Allowable Subject Matter

The Examiner objected claim 14 as being dependent upon a rejected base claim 1, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Applicants respectfully submit that claim 1 is allowable for the reasons summarized above, and as claim 14 depends upon an allowable amended base claim 1, Applicants respectfully submit that the claim is allowable.

Conclusion

In view of the remarks and amendments set forth above, Applicants respectfully request allowance of the pending claims. If the Examiner believes that a telephonic interview will help speed this application toward issuance, the Examiner is invited to contact the undersigned at the telephone number listed below.

Respectfully submitted,

Date: 5/8/2006

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